

VI. *On two remarkable cases of mimicry from Elopura, British North Borneo.* By H. J. S. PRYER.

[Read December 3rd, 1884.]

PLATE X.

SINCE the appearance of my friend Mr. George Lewis' valuable paper on the mechanical action of solar rays I have sought evidence for and against the views expressed therein, more particularly as affecting the questions of protective coloration and mimicry. Having obtained lately, while in Borneo, two most striking cases of mimicry which I think will throw some light on both points, I venture to lay the following remarks before the Society.

The first case is a large coleopteron mimicking an equally large hymenopteron:—

*Description.*—The beetle: Size,  $1\frac{3}{8}$  in. long; expanse of wings,  $2\frac{1}{2}$  in. The elytra are only  $\frac{3}{8}$  in. long, leaving the greater portion of the body exposed, after the manner of the *Staphylinidæ*. Antennæ, 1 in.; legs long, hind pair  $1\frac{3}{8}$  in. Colour: Antennæ, head, thorax, elytra, body, and legs, jet-black; wings also black, but having a large conspicuous white patch occupying the apical third of the wing; tip of the wing black.\*

The wasp: Size,  $1\frac{3}{8}$  in. long; expanse of wings,  $2\frac{1}{2}$  in. Antennæ,  $\frac{3}{8}$  in.; legs long, hind pair  $1\frac{3}{8}$  in. Colour:

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\* *Coloborhombus fasciatipennis*, n. s.

Niger velutinus; alis nigro-fuscis, fascia lata ante apicali alba. Long. 16 lin.

Velvety black, with scarcely any violet tint above; distinctly tinted with violet-blue below. The wings nearly black on the costa, shading into dark fuscous posteriorly, with slight bluish tints here and there. Near the apex of the wing there is a broad semi-transparent white band. Abdomen with a whitish silky spot on the side of the basal segment beneath.

*Hab.* Borneo.

This species differs from *C. hemipterus*, Fabr., from Java, chiefly in having a white band across the wings. The thorax is, however a little more transverse.—C. O. WATERHOUSE.

Antennæ, head, thorax, and body, jet-black; wings also black, but having a large conspicuous white patch occupying the apical third of the wing; tip of the wing black.\*

It will be seen that they agree in shape and colour, and the only difference is an unimportant one, in the length of the antennæ; the shape of the beetle agrees as nearly as it is possible to imagine insects so widely separated as a wasp and beetle could be.

It is singular that there is also a second species of wasp very closely resembling the one described, also common in North Borneo; it is, however, rather larger, and with yellow antennæ instead of black.

The second case is a large lepidopterous insect, a *Sesia*, mimicking a very large hymenopterous *Scolia*:—

*Description.*—The moth is a male, and therefore presumably somewhat smaller than the female. Size,  $1\frac{1}{4}$  in. long; expanse of wings, 2 in. Antennæ,  $\frac{1}{2}$  in.; hind legs nearly as long as the body, very hairy. Colour: Antennæ black; palpi yellow; head black; upper part of thorax black, lower part yellow; body black, with a conspicuous yellow band in the middle, and a little yellow on the 1st segment; legs black; wings of a uniform metallic blue-black, only excepting a clear space on the anal angle of the hind wing.†

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\* *Mygnumia aviculus*, Sauss. (Described from Java).—W. F. KIRBY.

† SCOLIOMIMA, n. g.

Allied to the African genus *Toosa* (= *Ninia*); primaries elongated, rather narrow, the costal margin nearly straight, slightly arched towards the apex, which is moderately acute; outer margin very oblique; inner margin nearly straight; costal vein lying very close to the margin, terminating a little beyond the middle of the costa; subcostal five-branched, the first two branches emitted before the end of the cell; the third and fourth emitted from the anterior angle of the cell, the fifth forking from the fourth half-way between the cell and the outer margin; disco-cellulars forming an oblique zigzag line; upper radial emitted above the middle of the disco-cellular; lower radial and third median branch emitted close together, and widely diverging from the first and second branches, which are also emitted close together; the whole (owing to the narrowness of the wing) being somewhat crowded together at the inferior extremity of the cell; submedian following the inner margin in its slight deviation from a straight line; secondaries elongated, with nearly straight costal margin; outer margin very gradually arched to abdominal margin, which is short and straight; costal vein running close to edge of costa; subcostal branches running parallel to about the basal third, where they unite

The bee: Size,  $1\frac{3}{8}$  in. long; expanse of wings,  $2\frac{3}{4}$  in. Antennæ,  $\frac{5}{8}$  in.; hind legs nearly as long as the body and hairy. Colour: Antennæ black; head yellow; upper part of thorax black, lower part yellow, extending to the 1st segment of the body; rest of the body black, with a conspicuous yellow band in the middle; wings of a uniform metallic blue-black; the anal angle of the hind wing projected. The colours of both bee and moth were identical when alive, but since their capture the yellow on the bee has changed to a brownish tint, and

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abruptly; disco-cellular veinlet obsolete; median branches widely separated; submedian and internal veins widely divergent; head large, broad, with prominent eyes; palpi large, recurved, densely scaled, with acute terminal joint; antennæ long, very thick, smooth, coarsely pectinated in front (not bipectinated); tapering, and with a small terminal pencil of hair at the distal extremity; collar broad; thorax very robust and convex; abdomen long, coarsely scaled, especially towards the anal extremity, which has an almost woolly appearance owing to the numerous long projecting scales which clothe the last three segments; anterior legs rather short and thick, the tibiæ broad and coarsely scaled; posterior legs densely clothed with coarse hair-scales, as in *Melittia*.

*Scoliomima insignis*, n. s.

An admirable mimic of *Triscolia patricialis*; the primaries metallic sap-green, with the apical border from fourth subcostal branch to third median bronze-brown (forming an almost triangular patch of this colour); secondaries bronze-brown, but nearly the whole basal half occupied by a broad patch of metallic sap-green; a transparent white spot at base of interno-median area; nearly the whole of the area enclosed between the submedian and internal veins also hyaline white; head black-brown, antennæ blue-black; palpi chrome-yellow, with black terminal joint; collar brilliant golden yellow; thorax black-brown, with two patches of yellow scales at the back; abdomen blue-black, with a golden-yellow belt on the basal segment and another on the 4th segment; under surface of body black, extremity of femora of posterior legs with a few white hairs; tarsi fringed with white hairs; expanse of wings, 56 mm.

The scales on the collar of this species are bent, in order to catch the light, and thus render the resemblance which this yellow band bears to that on the back of the head of the *Triscolia* more striking; the hairy legs no doubt help to make up the deficiency in the width of the abdomen needed to complete the similarity of the moth to the wasp.

The genus *Scoliomima* agrees best with *Toosa*, Walk., in form of wings, with *Melittia* in the clothing of its legs; but in its antennæ it comes nearer to *Tarsa*, though very distinct, owing to the unipectinate character of these organs. It should stand between *Toosa* and *Melittia*.—ARTHUR G. BUTLER.

the yellow on the body of the moth is now almost obliterated by grease.\*

The habits of these insects, as far as my observations go, are that the wasp, bee, and beetle fly about under the shade of the forest; the wasp and beetle frequently settle on the ground; the bee flies very heavily, making a loud buzzing noise; the moth, when first seen, was flying rapidly about a bush in the open, and was captured while at rest on a leaf in the full blaze of the sun.

The wasp (or beetle) is abundant, but difficult to capture; when flying or on the ground at a distance of six feet it is quite impossible to distinguish the wasp from the beetle, and I cannot therefore say which is most common, as I only succeeded in securing a single specimen of each. The bee is very common, but I only saw one of the *Sesia*, which was taken on Pulo Balhalla, an island just outside Sandakan Bay, and about two miles from Elopura.

I have unsuccessfully endeavoured to apply Mr. Lewis' theory to account for the remarkable resemblance shown in coloration, as having been effected by the mechanical action of light only, but in both instances we have an equally remarkable resemblance in form, which I think shows in a marked manner, more particularly in the case of the wasp and beetle, a wonderful intentional resemblance, indicating clearly the handiwork of an Almighty designer, effected doubtless by the agency of natural selection; in contradistinction to an objectless blind mechanical action of the laws of light, which cannot fortuitously have also altered or adapted the shape and size simultaneously in both cases to heighten the protection undoubtedly obtained by the resemblance in colour.

Granting for the sake of argument that the habits of the wasp and beetle are alike, and that both are subjected to the same solar influences, still in the case of the bee and moth the habits are very different. The moth when first seen was flying rapidly, and afterwards settled in the sun, this being in accordance with the usual habits of a *Sesia*, the bee, on the contrary, spending most of its time in the shade. The question of solar influence is also further complicated by the presence

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\* *Triscolia patricialis*. Burm. (Described from Sumatra).—  
W. F. KIRBY.

of a second species of wasp marked in nearly the same manner as the first.

From the view that the three insects (two wasps and a beetle) owe their similar coloration, irrespective of solar influence, to natural selection, the case at once becomes easy of comprehension. In the forests of Borneo the greatest destroyers of insect-life on the ground are lizards and birds such as the Pittas; the wasp and beetle, which frequently run on the ground, are conspicuously marked with a white spot, and exhibit this as a flag of danger to any would-be destroyer; no living creature would knowingly twice attack such a formidable insect as this wasp. I have seen a small *Sphex* attack and paralyse the largest of the tropical spiders. It is easy to understand how the beetle, having the same habits as the wasp, has ultimately assumed the same garb as the wasp through the influence of natural selection. It is also very probable that the resemblance in colour, shape, and habits indicates an even closer intimacy between the wasp and beetle, as the latter may be a parasite on the wasp, when the resemblance would be beneficial in a twofold measure. All three are very restless, sometimes running or flying in the shade, and at others in the sun, but always recognisable from a distance by the white spot.

It is also easy to understand how the moth became so much like the bee, by the action of natural selection; all the *Sesiæ* resemble bees and wasps to a certain extent, although their habits are widely different from the Hymenoptera. The *Sesiæ* spend a great deal of their existence either sunning themselves on a trunk or leaf, or flying with so great rapidity as to be nearly invisible. This particularly large *Sesia* has come to resemble in coloration a large bee, owing to the survival of those most closely approaching the bee, until the resemblance has become perfected in the manner we now see it, these having a manifest advantage when propagating their species.

EXPLANATION OF PLATE X.

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- FIG. 9. *Triscolia patricialis*, Burm.  
10. *Scolionima insignis*, Butl.  
11. *Mygymia aviculus*, Sauss.  
12. *Coloborhombus fasciatipennis*, C. O. Waterh.